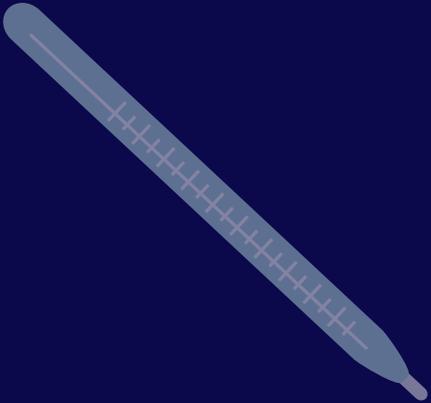




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**MDCAT
PHYSICS
PRACTICE MCQS**



WITH ANSWER KEYS

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WORKSHEET 1

UHS UNIT 1 | MEASUREMENT

- The frequency of vibration in string is written by equation $f = \frac{1}{2l} \sqrt{\frac{F}{m}}$. What is the unit of m in this equation
A) kg
B) kg m^{-1}
C) km
D) None of these
- Base units are those which
A) Cannot split further
B) Use to define other units
C) Cannot define in term of other
D) All are correct
- Which of the following is derived quantity?
A) Area
B) Mass
C) Length
D) Time
- Power in terms of base unit is written as
A) $\text{kg m}^2 \text{s}^{-3}$
B) $\text{kg m}^2 \text{s}^{-1}$
C) $\text{kg m}^2 \text{s}^{-2}$
D) kg ms^{-1}
- Dimensional formula for the angle of contact is
A) $[M^{-1}L^{-1}T^0]$
B) $[ML^1T^{-1}]$
C) $[M^0L^0T^1]$
D) $[M^0L^0T^0]$
- Joule-second is a unit of
A) Energy
B) Power
C) Momentum
D) Angular momentum
- The fundamental physics which is also known as the heart of science is
A) The world of extremely large
B) The world of extremely small
C) The world of complex matter
D) None of these
- If L = inductance R = Resistance C = Capacitance and V = Potential difference then units of L/RCV is same that of
A) Current
B) Charge
C) $1/\text{Current}$
D) $1/\text{Charge}$

- Which of the given is a supplementary quantity
A) Plane angle
B) Radian
C) Steradian
D) Both B and C
- Pascal-second is a unit of
A) Time
B) Viscosity
C) Linear speed
D) Angular speed
- Which of following definition is correct and use only quantities rather than unit
A) Density is mass per cubic meter
B) Potential difference is energy per unit coulomb
C) Pressure is force per unit area
D) Speed is distance per second
- The fundamental physics which is also known as the heart of science is
A) The world of extremely large
B) The world of extremely small
C) The world of complex matter
D) None of these
- In F.P.S system, the unit of length is
A) Meter
B) Centimeter
C) Foot
D) Milli meter
- The solid angle subtended by a closed sphere at its center is
A) $4\pi r^2$
B) $2\pi r$
C) 2π
D) 4π
- Let L denote the self-inductance of a coil which is in series with a capacitor of capacitance C . which of the following has dimensions of time?
A) \sqrt{LC}
B) C/L
C) CL
D) L^2/C^2
- In the international system of units, R is measured as
A) $\text{J mol}^{-1} \text{K}^{-1}$
B) J K^{-1}
C) J mol^{-1}
D) J mol K^{-1}

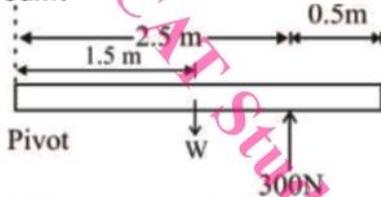
17. The angle between two radii of circle which cut off on the circumference an arc equal in length to the radius, is:
 A) 57.3°
 B) $\pi/180$
 C) 0.01745°
 D) 45°
18. Radioactive decay constant has same dimensional formula as
 A) Mole
 B) Frequency
 C) Time period
 D) Mass
19. The formula for electric field strength is $E = F/Q$, where E is electric field strength, F is force and Q is charge. Which of the following options gives the correct base units for electric field strength?
 A) $\text{kgms}^{-3}\text{A}^{-1}$
 B) $\text{kg}^2\text{m}^{-1}\text{s}^2\text{A}$
 C) kgms^{-2}A
 D) $\text{kgms}^{-2}\text{A}^{-1}$
20. Which of following quantity can be expressed in kg s^{-2}
 A) Viscosity
 B) Density
 C) Spring constant
 D) Momentum
21. Light year gives measurement about
 A) Space & time
 B) Speed of light
 C) Area of velocity time graph
 D) Age of universe
22. To represent a physical quantity the least requirement is
 A) Number
 B) Number and unit
 C) Number, prefix, and unit
 D) Number, unit and direction
23. Density of air is 1.2 kgm^{-3} . It can be expressed in gm cm^{-3} by
 A) 1.2×10^{-3}
 B) 1.2×10^6
 C) 1.2×10^4
 D) 1.2×10^3
24. 1 light year is equal to
 A) $9.5 \times 10^{15} \text{ m}$
 B) $9.5 \times 10^{15} \text{ km}$
 C) $9.5 \times 10^{-15} \text{ m}$
 D) $9.5 \times 10^{16} \text{ km}$

25. The amount of energy in 1 kg mass in erg is
 A) $9 \times 10^{16} \text{ erg}$
 B) $9 \times 10^{21} \text{ erg}$
 C) $9 \times 10^{-23} \text{ erg}$
 D) $9 \times 10^{23} \text{ erg}$
26. Which one is not a physical quantity
 A) energy
 B) speed
 C) time
 D) kg
27. Which of following definition is correct and use only quantities rather than unit
 A) Density is mass per cubic meter
 B) Potential difference is energy per unit time
 C) Pressure is force per unit area
 D) Speed is distance per second
28. Which one is the least sub-multiple
 A) Pico
 B) Femto
 C) Nano
 D) Atto
29. Which of the following pairs of physical quantities have different dimension?
 A) Stress, pressure
 B) Energy, Torque
 C) Density, viscosity
 D) Young modulus, energy density
30. One nanometer is equal to
 A) 10^9 mm
 B) 10^{-6} cm
 C) 10^{-7} cm
 D) 10^{-9} cm

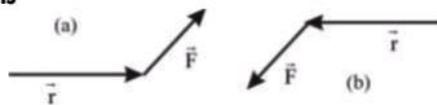
WORKSHEET 2

UHS UNIT 2 | MOTION AND FORCE

1. A long uniform beam is pivoted at one end. A force of 300N is applied to hold the beam horizontally. What is the weight of the beam?



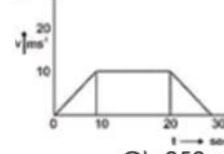
- A) 300 N C) 500 N
B) 480 N D) 960 N
2. The displacement-time graph of a particle moving with uniform velocity is
A) parabola C) circle
B) straight line D) hyperbola
3. If the constant force is being applied on the body it will move with (neglect friction)
A) Constant velocity
B) Constant acceleration
C) Zero acceleration
D) None of these
4. The ratio of distance to displacement along a semi circle of radius r is
A) 2π C) $\pi/2$
B) π D) $\pi/4$
5. The body is said to be in dynamic equilibrium if
A) The body is moving with uniform velocity
B) The body is moving with zero acceleration
C) The body is moving with zero angular acceleration
D) All of these
6. In a given figure a) body rotates in anti clockwise then direction of torque in figure b) is



- A) Clockwise
B) Can't rotate at all
C) Anti clockwise
D) Unpredictable

7. The displacement time graph for two bodies A and B are straight lines inclined at 60° and 30° to time axis. Find ratio of their speed is
A) 3 : 1 C) 1 : 3
B) $\sqrt{3} : 1$ D) 1 : $\sqrt{3}$

8. In the given graph distance traveled is

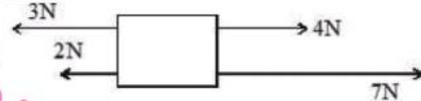


- A) 200 m C) 250 m
B) 300 m D) 400 m

9. If $R = \frac{R_{\max}}{2}$ then angle of projection is

- A) 30° C) 15°
B) 60° D) 45°

10. What is the resultant of forces shown in figure



- A) Zero C) 6N to left
B) 6N to right D) 11 N to right

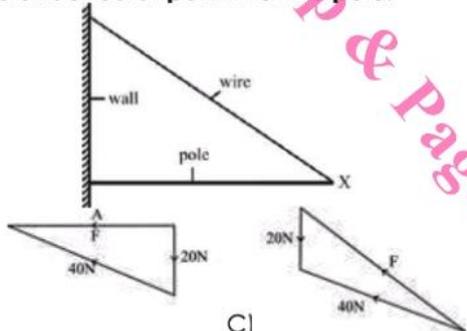
11. An athlete completes one round of a circular track of radius R in 40sec what will be displacement at the end of 1minute.

- A) 0 C) R
B) $2R$ D) $3\pi R$

12. Work done by torque will be equal to

- A) Fd C) $r\theta$
B) $l\alpha$ D) $r\theta$

13. The diagram shows a sign of weight 20 N suspended from a pole attached to a wall. The pole is kept in equilibrium by a wire attached at point X of the pole.



A)

C)

WORKSHEET 3

UHS UNIT 3, 4 | WORK, ENERGY AND POWER, CIRCULAR MOTION

- A force of $(3\mathbf{i} + 2\mathbf{j} + 4\mathbf{k})$ N gives a displacement of $(10\mathbf{j})$ m. The work done is**
 - 20 J
 - 26 J
 - 32 J
 - Zero
- A moving body need not have**
 - K.E
 - P.E
 - momentum
 - velocity
- A body travels displacement of 10 m by force of 5N If work done is 25 J then angle between \vec{F} and \vec{d} is**
 - 0°
 - 30°
 - 45°
 - 60°
- Work-Energy principle is valid in the presence of**
 - external forces only
 - internal forces only
 - conservative forces only
 - all of these
- When person lifts a body from the ground, work done by the lifting force is**
 - positive
 - negative
 - zero
 - one
- When a conservative force does positive work on a body the P.E of body**
 - increases
 - remains same
 - decreases
 - may increase or decrease
- Kinetic energy of a body moving with speed of 10 m/s is 30J. If its speed becomes 30 m/s its K.E will be**
 - 10 J
 - 90 J
 - 180J
 - 270J
- The time taken by an engine of power 10 kW to lift a mass of 200 kg to the height of 40 m is**
 - 2 s
 - 4 s
 - 8 s
 - 16 s
- 1 Horse power is equal to**
 - 746 J
 - 746 KWh
 - 746 W
 - 746 MWh
- The consumption of energy by 60 watt bulb in 2 sec is**
 - 120 J
 - 30J
 - 60 J
 - 10 J
- According to the first law of Newton, mass of an object is qualitative measure of its**
 - inertia
 - momentum
 - moment of inertia
 - force
- At which angle work done equal to half of its maximum value**
 - 30°
 - 60°
 - 45°
 - 90°
- If is non-conservative force**
 - friction
 - tension in string
 - air resistance
 - all of these
- Absolute P.E at the surface of earth is**
 - $\frac{Gmm}{R^2}$
 - $-\frac{GmM}{R}$
 - $\frac{GmM}{R}$
 - $\frac{GmM}{r}$
- The food which we eat in 3 days produce energy equal to energy from _____ litre of petrol**
 - 1
 - 3
 - 1/3
 - 9
- Which one is bigger unit of energy**
 - erg
 - Joules
 - kilowatt-hour
 - electron volt

17. A body falls freely under gravity. Its velocity is v when it has lost a potential energy of U . The mass of the body is

- A) $\frac{2U}{v^2}$
- B) $\frac{U}{v^2}$
- C) $\frac{U}{2v^2}$
- D) $v \times U$

18. Unit of power is Watt, which is defined as

- A) 1 kJ/s
- B) 1 J/hr
- C) 1 kJ/hr
- D) None

19. The period of a satellite in a circular orbit of radius R is T . The period of another satellite in a circular orbit of radius $4R$ is

- A) $8T$
- B) $4T$
- C) $T/4$
- D) $T/8$

20. The angular speed of hour's hand of mechanical watch is _____ radian per hours

- A) $\pi/6$
- B) $\pi/4$
- C) $\pi/12$
- D) $\pi/8$

21. A satellite appears to be at rest when seen from the equator. Its height from the earth surface is nearly

- A) 35600 km
- B) 356000 km
- C) such a satellite cannot exist
- D) 6400 km

22. A wheel rotates about an axis passing through the centre and perpendicular to the plane with slowly increasing angular speed. Thus it has:

- A) radial velocity and radial acceleration
- B) tangential velocity and radial acceleration
- C) tangential velocity and tangential acceleration
- D) tangential velocity but acceleration having both components

23. Angle between linear and angular velocity is

- A) 90°
- B) 180°
- C) 0°
- D) 45°

24. $2\pi R$ subtends an angle of

- A) 1 radian
- B) 2 radian
- C) π radian
- D) 2π radian

25. Work done by central force is

- A) Maximum
- B) Minimum
- C) Zero
- D) Negative

26. The angular velocity of a wheel increases from 100 rps to 300 rps in 10s. The number of revolutions made during that time is

- A) 600
- B) 1500
- C) 1000
- D) 2000

27. Rate of change of angular momentum is called

- A) Force
- B) Power
- C) Torque
- D) Weight

28. The ratio of escape to orbital velocity

- A) $\sqrt{2}$
- B) $\frac{1}{\sqrt{2}}$
- C) 2
- D) 1

29. When a body moves along a circle path, its velocity:

- A) remains constant
- B) becomes zero
- C) changes continuously
- D) always increases

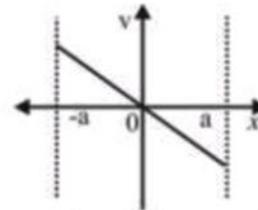
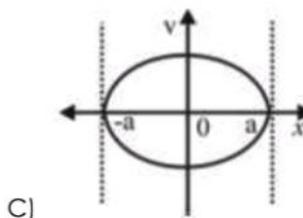
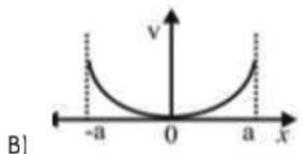
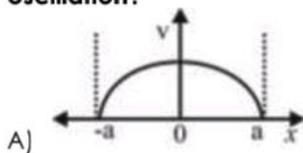
30. An artificial satellite orbiting around the earth does not fall down because the attraction of the earth

- A) vanishes at such distances
- B) is balanced by the attraction of the moon
- C) is maximum at such a distance
- D) provides the necessary acceleration for its motion in a curved path

WORKSHEET 4

UHS UNIT 5, 6 | OSCILLATIONS, WAVES

1. A second's pendulum is placed in a space laboratory orbiting around the earth at a height $3R$ from the earth's surface where R is the radius of the earth. The time period of the pendulum will be
 A) Zero C) $2s$
 B) $2/3 s$ D) Infinite
2. The speed of sound in air is 350 ms^{-1} the fundamental note emitted by tube of 0.5m closed at one end
 A) 50 Hz C) 175 Hz
 B) 350 Hz D) 500 Hz
3. A simple pendulum is made of body which is hollow sphere containing mercury suspended by means of a wire. If a little mercury is drained off, the period of pendulum will
 A) remain same C) decrease
 B) increase D) become erratic
4. Overtones produced by a closed-end organ pipe are
 A) $f, 3f, 5f, \dots$ C) $3f, 5f, 7f, \dots$
 B) $2f, 3f, 4f, \dots$ D) $f, 2f, 3f, \dots$
5. Which graph best shows how the velocity v of an object performing simple harmonic motion of amplitude a varies with displacement x for one complete oscillation?



- D)
6. When water waves pass from deep water into shallow water how do the frequency, wave length and speed change

Frequency	Wavelength	Speed
A) Increases	Decreases	No change
B) No change	Increases	Increases
C) No change	Decreases	Decreases
D) None of these		
 7. At what displacement from the mean position the K.E or the P.E becomes one half of its maximum value
 A) $x_0/\sqrt{3}$
 B) $x_0/2$
 C) $x_0/\sqrt{2}$
 D) $2x$
 8. If a spring of spring constant ' k ' is cut into two equal parts, then the spring constant of each part will be
 A) k
 B) $2k$
 C) $k/2$
 D) $4k$
 9. If the number of loops of a stationary wave are increasing then
 A) λ increases
 B) λ decreases
 C) λ remains same
 D) λ may increase or decrease
 10. The first resonance length in a closed pipe is 20 cm then second resonance occurs at
 A) 60 cm
 B) 90 cm
 C) 120 cm
 D) 80 cm
 11. The number of antinodes between two successive nodes is
 A) 1
 B) 2
 C) 3
 D) 4

12. The wavelength of wave is 1m and period is 2 sec. Its wave speed is
 A) 2ms^{-1} C) 0.5ms^{-1}
 B) 5ms^{-1} D) 0.25ms^{-1}
13. The displacement of S.H.M of amplitude x_0 in one period is
 A) x_0 C) $4x_0$
 B) $2x_0$ D) Zero
14. A particle is performing S.H.M with maximum velocity v . If its amplitude is made three times, then its velocity at $x = 0$ will become
 A) v C) $v/3$
 B) $3v$ D) Zero
15. A certain source of sound produces a sound of frequency 200Hz. If the frequency is 400 Hz. Then speed of sound as compared to original becomes
 A) Half C) Double
 B) Four times D) None of these
16. A particle is performing S.H.M with time period T and amplitude A . The time at which its displacement is $A/\sqrt{2}$ is
 A) T C) $T/8$
 B) $T/4$ D) $T/12$
17. A string of length 'l' can maintain stationary waves of λ_n given by
 A) $\frac{2n}{l}$ C) $\frac{l}{n}$
 B) $\frac{2l}{n}$ D) $\frac{n}{2}$
18. The wavelength of fundamental mode of vibration of closed organ pipe is
 A) $2L$ C) L
 B) $4L$ D) $L/2$
19. A simple harmonic oscillator has amplitude 'A' and time period T . Its maximum speed will be
 A) $\frac{4A}{T}$ C) $\frac{2A}{T}$
 B) $\frac{4\pi A}{T}$ D) $\frac{2\pi A}{T}$
20. The vertical extension in a light spring by a weight of 1kg in equilibrium, is 9.8 cm. the period of oscillation of the spring in second, will be
 A) $\frac{2\pi}{10}$
 B) 20π
 C) $\frac{2\pi}{100}$
 D) 200π
21. The phase difference between velocity and acceleration of a particle executing S.H.M is
 A) π
 B) $\pi/2$
 C) 2π
 D) 3π
22. Two springs have force constants in the ratio 4:9. Their time periods are in the ratio of
 A) 3:2 C) 2:3
 B) 1:3 D) 3:1
23. A particle executes SHM with a time period of 2s and amplitude 4cm. Maximum magnitude of its velocity is
 A) $10\pi\text{ cm/s}$ C) $20\pi\text{ cm/s}$
 B) $2.5\pi\text{ cm/s}$ D) $4\pi\text{ cm/s}$
24. The speed of sound of frequency f is v . The speed of sound having frequency $2f$ is
 A) v C) $v/2$
 B) $2v$ D) $\sqrt{2}v$
25. At mean position of harmonic oscillator
 A) minimum K.E and minimum P.E
 B) maximum K.E and minimum P.E
 C) minimum K.E and maximum P.E
 D) maximum K.E and maximum P.E
26. The speed of sound waves having a frequency of 256 Hz compared with the speed of sound having a frequency of 512 Hz is
 A) Half C) Four times
 B) Twice D) Same
27. A simple pendulum is oscillating in a lift. If lift starts moving upward with acceleration its period will
 A) Increase
 B) Decrease
 C) Remains same
 D) Cannot produced
28. The graph of acceleration as a function of displacement in S.H.M is
 A) Straight line C) Circle
 B) Parabola D) Ellipse
29. A source of sound is moving towards a stationary observer with $1/10$ of the speed of sound. The ratio of apparent to actual frequency of sound is
 A) $10/9$
 B) $11/10$
 C) $11/9$
 D) $9/11$

WORKSHEET 5

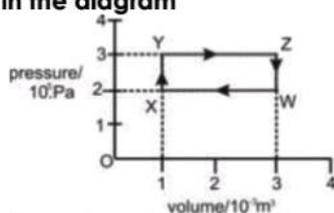
UHS UNIT 7 | LIGHT

- If YDSE is shifted into the water then fringe spacing**
 - will decrease
 - will increase
 - will remain same
 - will disappear
- For glass-water boundary, the value of critical angle will be (their refractive indexes respectively are 1.6 and 1.33)**
 - $\sin^{-1} (1.33/1.6)$
 - $\sin^{-1} (1.6/1.33)$
 - 90°
 - Zero
- The central part of Newton's rings is dark due to the reason that**
 - the reflection from the lower surface of air film undergoes a phase shift of 180°
 - the part of the ray reflected from upper surface of plane convex lens undergoes a phase shift of 180°
 - the reflection from the upper surface of air film undergoes a phase shift of 180°
 - all of the above
- $d \sin \theta = \frac{m\lambda}{2}$ holds constructive condition for**
 - Double slit Experiment
 - Single slit
 - X-rays diffraction
 - All of these
- If 3000 lines per cm are present on diffraction grating then, its grating element is**
 - 2.5×10^{-6}
 - 3×10^{-6}
 - 3.3×10^{-6}
 - 3.5×10^{-6}
- Light travels with a speed of $2 \times 10^8 \text{ ms}^{-1}$ in crown glass of refractive index 1.5. What is the speed of light in dense flint glass of refractive index 1.8?**
 - $1.33 \times 10^8 \text{ ms}^{-1}$
 - $1.67 \times 10^8 \text{ ms}^{-1}$
 - $2.0 \times 10^8 \text{ ms}^{-1}$
 - $3.0 \times 10^8 \text{ ms}^{-1}$
- In fibre optics which of the following colour has greater speed**
 - Red
 - Green
 - Blue
 - All have same speed
- Light from sun reaches the earth in form of**
 - circular wave front
 - plane wave front
 - cylindrical wave front
 - all of these
- Bending of light around the edges of obstacle is called**
 - diffraction
 - polarization
 - reflection
 - all of these
- Sound waves cannot be**
 - Refracted
 - reflected
 - polarized
 - mode to produce interference
- The diameter of the objective of a microscope is D , the light use has wavelength λ . The resolving power of the microscope is**
 - $\frac{\lambda}{D}$
 - $\frac{1.22 \lambda}{D}$
 - $\frac{D}{1.22 \lambda}$
 - $\frac{\lambda}{1.22 D}$
- A source of monochromatic light is viewed through a diffraction grating. Which of the following causes the angle to increase?**
 - Decreasing the distance between adjacent slits on the grating
 - Decreasing the wavelength of the monochromatic light
 - Increasing the distance of the eye from the grating
 - Increasing the number of slits of the grating but keeping the slit spacing the same
- The phase difference between two points of a wave front is**
 - Zero
 - π
 - $\pi/2$
 - $\pi/4$
- The fiber which has a core of relatively larger diameter such as $50 \mu\text{m}$ is**
 - Multimode graded index fiber
 - Multimode step index fiber
 - Single mode step index fiber
 - All of these

WORKSHEET 6

UHS UNIT 8 | HEAT AND THERMODYNAMICS

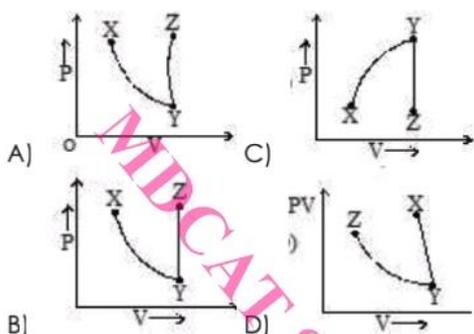
- According to kinetic theory of gases, the size of molecule is
 - Much smaller than the separation between molecules
 - Much larger than the separation between molecules
 - Both "A" and "B"
 - None of these
- The thermodynamic temperature of an ideal gas is raised from 27°C to 327°C . Which quantity must be doubled?
 - The root-mean-square speed of the molecules
 - The square of the mean speed of the molecules
 - The mean speed of the molecules
 - The mean square speed of the molecules
- A gas undergoes the cycle of pressure and volume changes $W \rightarrow X \rightarrow Y \rightarrow Z \rightarrow W$ shown in the diagram



What is the net work done by the gas?

- 600 J
 - 200 J
 - 0 J
 - 200 J
- One mole of a gas at STP is suddenly expanded to three times its initial volume. If $C_v = 2R$ the ratio of the initial and final pressure will be
 - 5
 - 4
 - 3
 - 2
 - A heat engine absorbs 400J of heat and performs 300×10^7 erg of work, the change in its internal energy will be
 - 100 J
 - 100 Erg
 - 2×10^7 J
 - 300 J
 - For a certain gas the ratio of specific heats is given to be $= 1.5$. For this gas
 - $C_v = 3R$
 - $C_v = 5R$
 - $C_p = 3R$
 - $C_p = 5R$

- An ideal gas undergoes an expansion in volume from $1.3 \times 10^{-4} \text{m}^3$ to $3.6 \times 10^{-4} \text{m}^3$ at a constant pressure of $1.3 \times 10^5 \text{Pa}$. During this expansion, 24J of heat is supplied to the gas. What is the overall change in the internal energy of the gas?
 - Decrease of 54J
 - Decrease of 6J
 - Increase of 6J
 - Increase of 54J
- Theoretically the volume of the gas becomes zero at
 - 273.16 K
 - 0 K
 - 273.16 K
 - 273 K
- Entropy change is minimum in _____ process
 - adiabatic
 - isothermal
 - isobaric
 - isochoric
- No work is done in _____ process
 - Isothermal
 - Adiabatic
 - Isobaric
 - Isochoric
- Which of the following is not true
 - Temperature is constant during adiabatic expansion
 - Heat can flow from cold body to hot body without expenditure of energy
 - Change in entropy in a reversible process is positive
 - All of these
- A temperature of 68°F will be equal to a temperature of
 - 10°C
 - 20°C
 - 68°C
 - 30K
- An ideal gas exerts a pressure of a 60 Pa when temperature is 400k and the number of molecules present in unit volume in n. Another sample of the same gas exerts a pressure of 30Pa when its temperature is 300K. The number of molecules present in unit volume in the second sample is
 - $\frac{4n}{3}$
 - $\frac{3n}{4}$
 - $\frac{2n}{3}$
 - $\frac{n}{2}$
- A fixed mass of gas, initial at pressure P_1 in state X, is expanded reversibly and isothermally to state Y and then compressed reversibly and adiabatically until the pressure is again P_1 in state Z. Which one of the following graphs best represents this sequences of events?



15. Which of the following gases possess maximum root mean square velocity at a given temperature
 A) hydrogen C) nitrogen
 B) oxygen D) helium
16. A gas is enclosed in a container which is then placed on a fast uniformly moving train. The temperature of the gas
 A) Rises C) Falls
 B) Unchanged D) Unsteady
17. If two system X and Y are in thermal equilibrium. If X is heated at constant volume and Y is heated at constant pressure, and again finally maintained at thermal equilibrium, then heat Q given to the systems X and Y and internal energy U stored in the systems X and Y are
 A) $Q_x = Q_y$ and $U_x = U_y$
 B) $Q_x < Q_y$ and $U_x < U_y$
 C) $Q_x = Q_y$ and $U_x < U_y$
 D) $Q_x < Q_y$ and $U_x = U_y$
18. Pressure exerted by a perfect gas is equals
 A) Mean K.E. per unit volume
 B) $1/2$ of mean K.E. per unit volume
 C) $1/3$ of mean K.E. per unit volume
 D) $2/3$ of mean K.E. per unit volume
19. The temperature of gas is increased from 27°C to 127°C . The ratio of the its mean K.E will be
 A) $10/9$ C) $9/13$
 B) $4/3$ D) $3/4$
20. By exerting pressure, gas releases 20 J of heat and 8 J of work is done on the gas. If initial internal energy of the gas was 30 J then final internal energy be
 A) 2 J B) 18 J C) 42 J D) 58 J
21. A gas expands under constant pressure P from V_1 to V_2 . The work done by the gas is
 A) $P(V_2 - V_1)$ C) $P(V_2^{Y_1} - V_2^{Y_2})$
 B) $P(V_1 - V_2)$ D) $P\left(\frac{1}{V_1} - \frac{1}{V_2}\right)$

22. An ideal gas is compressed at constant temperature. Which line of the table is correct?

	Work done	Heat Energy
A)	By gas	Goes into gas
B)	By gas	Goes out of gas
C)	On gas	Goes into gas
D)	On gas	Goes out of gas

23. The internal energy of a gram-molecule of an ideal gas depends upon

- A) Pressure C) Volume
 B) Temperature D) Both A and B

24. Formula to convert Celsius scale into Fahrenheit scale is

- A) $\frac{C}{5} = \frac{F - 32}{9}$ C) $\frac{C}{9} = \frac{F - 32}{5}$
 B) $\frac{C}{5} = \frac{F + 32}{9}$ D) $\frac{C}{9} = \frac{F + 32}{5}$

25. Which of the following pairs represent units of the same physical quantity

- A) K & J C) K & Cal
 B) N & Cal D) J & Cal

26. Correct expression for pressure of a gas acting on wall of a container is

- A) $P = \frac{Nm \langle v \rangle}{3l^3}$ C) $P = \frac{3l^2 \langle v^2 \rangle}{Nm}$
 B) $P = \frac{Nm \langle v^2 \rangle}{3l^3}$ D) $P = \frac{m \langle v^2 \rangle}{3l^2}$

27. Working stroke of petrol engine is called

- A) Intake C) Power
 B) Compression D) Exhaust

28. A given system undergoes a change in which work done by the system equals the decrease in internal energy. The system must have undergone a change?

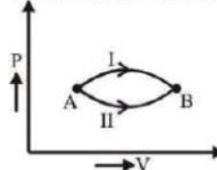
- A) Isothermal C) Adiabatic
 B) Isobaric D) Isochoric

29. If a system undergoes contraction of volume, then the work done by the system is

- A) Positive C) Negative
 B) Negligible D) Zero

30. A gas at state A changes to state B through path I and II shown in figure. The change in internal energy is ΔU_1 and ΔU_2 respectively. Then

- A) $\Delta U_1 > \Delta U_2$
 B) $\Delta U_1 = \Delta U_2$
 C) $\Delta U_1 < \Delta U_2$
 D) $\Delta U_1 = \Delta U_2 = 0$

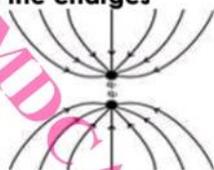


WORKSHEET 7

UHS UNIT 9 | ELECTROSTATICS

- The magnitude of $\frac{1}{4\pi\epsilon_0}$ is
 - 9×10^9
 - 9×10^{-9}
 - 8.85×10^{-12}
 - 8.85×10^{12}
- Unit of electric field is not equivalent to
 - N/C
 - J/C
 - V/m
 - J/C.m
- A proton (mass = 1.67×10^{-27} kg) on entering in a vertical electric field E is balanced. Then the electric field strength is
 - 10^{-9} Vm⁻¹
 - 10^{-7} Vm⁻¹
 - 10^{-6} Vm⁻¹
 - 10^{-8} Vm⁻¹
- A and B are two points in an electric field. If the work done in carrying 4.0 coulomb of electric charge from A to B is 16.0 joule the potential difference between A and B is
 - Zero
 - 4 V
 - 2.0 V
 - 16V
- How many electrons will have a charge of one coulomb?
 - 6.2×10^{18}
 - 5.2×10^{18}
 - 6.2×10^{19}
 - 5.2×10^{19}
- If a charge is moved against the coulomb force of an electric field
 - work is done by the electric field
 - energy is used from some outside source
 - The strength of the field is decreased
 - The energy of the system is decreased
- Two point charges +2C and +6C repel each other with a force of 12 N. If a charge of -2C is given to each of these charges, the force will now be
 - Zero
 - 8 N (repulsive)
 - 8 N (attractive)
 - 16 N (attractive)
- A hollow sphere of copper is positively charged. Then the electric field inside the sphere is
 - the same as the field at the surface
 - greater than the field at the surface
 - less than the field at the surface but not zero
 - Zero
- Electric lines of force about a negative point charge are
 - circular, anticlockwise
 - circular, clockwise
 - radial inwards
 - radial, outwards
- Energy of an electric capacitor of capacity C, when subjected to a potential V, is given by
 - $\frac{1}{2} CV^2$
 - CV
 - $\frac{1}{2} C^2V$
 - C/2V
- If RC is small, then capacitor will be charged and discharged
 - slowly
 - quickly
 - with medium speed
 - with constant speed
- Due to polarization of the dielectric, the capacitance of the capacitor
 - increases
 - decreases
 - zero
 - no change
- The electrostatic force between two point charges q_1 and q_2 at separation r is given by $F = kq_1 q_2 / r^2$. The constant k depends on
 - System of units only
 - Medium between charges only
 - Both A and B
 - None of A and B
- The SI unit of permittivity of free space is
 - $\frac{C}{Nm}$
 - $\frac{C^2}{(Nm)^2}$
 - $\frac{Nm^2}{C^2}$
 - $\frac{C^2}{Nm^2}$
- Capacity of a parallel plate capacitor can be increased by
 - increasing distance between plates
 - increasing thickness of plates
 - decreasing distance between plates
 - decreasing thickness of plates
- Two charges are in vacuum at a distance d apart. The force between them is F. If a medium of dielectric constant 4 is introduced between them, the force will now be
 - 4F
 - F/2
 - 2F
 - F/4

17. The given figure is a plot of lines of force due to two charges q_1 and q_2 . Figure out the sign of the charges



- A) both negative
 B) q_1 negative and q_2 positive
 C) both positive
 D) q_1 positive and q_2 negative
18. Two plates are 2cm apart. If a potential difference of 10 volt s is applied between the plates. The electric field between the plates will be
- A) 20 N/C
 B) 250 N/C
 C) 500 N/C
 D) 250 N/C
19. The capacitance of a parallel plate capacitor does not depend on
- A) area of the plates
 B) medium between the plates
 C) nature of metal plates
 D) distance between the plates
20. The difference of potential energy per unit charge is called
- A) electric potential
 B) potential difference
 C) absolute potential
 D) all of these
21. The space between the plates of a capacitor is filled by a liquid of dielectric constant k . The capacitance of the capacitor
- A) increases by a factor k
 B) decreases by a factor k
 C) increases by a factor k^2
 D) decreases by a factor k^2
22. Potential due to charge q at distance 1m is 5V, at distance 3m will be
- A) 5/3 volts
 B) 3/5 volts
 C) 7/3 volts
 D) 3/7 volts
23. Coulomb's law is applicable on
- A) spherical distribution of charge
 B) line distribution of charge
 C) surface distribution of charge
 D) point charge

24. Two point charges are separated by a distance of 4m. The force between them is 4N. What is the force between the charges, when the distance between them is 1m

- A) 16 N
 B) 1 N
 C) 64N
 D) 32N

25. Capacitance with air is $10\mu\text{F}$, if a dielectric of $\epsilon_r = 100$ is inserted then new capacitance

- A) 1000 F
 B) $1000\mu\text{F}$
 C) $10\mu\text{F}$
 D) $100\mu\text{F}$

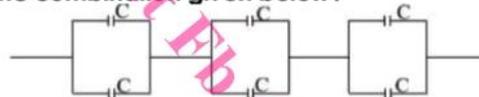
26. Uniform electric field exist

- A) near positive charge
 B) near negative charge
 C) between two equal and oppositely charged plates
 D) between two equal and oppositely charged infinite plates

27. If the distance between the plates of a capacitor is halved and area of each plate is doubled then its capacitance becomes

- A) doubled
 B) halved
 C) quadrupled
 D) remains same

28. What will be the equivalent capacitance of the combination given below?



- A) $3C$
 B) $2/3 C$
 C) $3/2 C$
 D) $2C$

29. Value of the capacitance depends upon

- A) Thickness of the capacitors plates
 B) Voltage applied
 C) Charge on the plates
 D) Geometry of the capacitor

30. A $50\mu\text{F}$ capacitor has a potential difference of 8V across it, the charge on the capacitor is

- A) $4 \times 10^{-4} \text{ C}$
 B) $6.25 \times 10^{-6} \text{ C}$
 C) $4 \times 10^{-3} \text{ C}$
 D) $6.25 \times 10^{-5} \text{ C}$

WORKSHEET 8

UHS UNIT 10 | CURRENT – ELECTRICITY

- When a solid body is negatively charged by friction, it means that the body has**
 - acquired excess of electrons
 - lost some protons
 - acquired some electron and lost a lesser number of protons
 - lost some positive ions
- Conductivity is the**
 - reciprocal of current density
 - reciprocal of resistivity
 - reciprocal of resistance
 - same as current
- The terminal potential difference of a cell when open circuited is**
 - E
 - E/2
 - zero
 - ∞
- Two bulbs having the ratings 40W, 220V and 20 W, 110 V. The ratio of their resistance is**
 - 1:2
 - 2:1
 - 1:1
 - 1:4
- Electrical energy used per second is given by**
 - VI
 - I^2R
 - V^2/R
 - all of these
- If the potential difference across a conductor is doubled the rate of heat production will become**
 - double
 - $\sqrt{2}$ times
 - half
 - four times
- Internal resistance and emf of a cell can be determined by an instrument**
 - CRO
 - AVO meter
 - Both CRO & AVO meter
 - potentiometer
- Resistivity of a conductor depends upon.**
 - temperature
 - nature of the material
 - both temperature and nature of the material
 - temperature, length & nature of the material
- Conventional current flows from**
 - low potential to high potential
 - high potential to low potential
 - high temperature to low temperature
 - low temperature to high temperature
- Four identical resistors, each of 1 Ω , are connected in balanced wheat stone bridge. The equivalent resistance between A and B is**
 - 1.5 ohm
 - 2.5 ohm
 - 1.0 ohm
 - 3.0 ohm
- The resistance of a wire is R. It is stretched uniformly so that its length is doubled The resistance now becomes**
 - 2 R
 - 4R
 - R/2
 - R/4
- The specific resistance of a wire**
 - varies with its length
 - varies with its mass
 - varies with its cross section
 - does not depend on its length, cross section and mass
- Three resistances, each of 4 Ω , are connected to form a triangle. The resistance between any two terminals is**
 - 2 Ω
 - 6 Ω
 - 8/3 Ω
 - 12 Ω
- A wire has resistance 6 Ω it is cut into two parts and both half values are connected in parallel. The new resistance is**
 - 6 Ω
 - 3 Ω
 - 12 Ω
 - 1.5 Ω
- Kirchhoff's two laws for electrical circuits are manifestations of the conservation**
 - charge only
 - energy only
 - both energy and momentum
 - both charge and energy
- Graph between V and I for non-ohmic devices**
 - straight line
 - always not straight line
 - usually not straight line
 - some time straight line
- A student has 10 resistors, each of resistance r. The minimum resistance that can be obtained by him using these resistors is**
 - 10 r
 - r/100
 - r/10
 - r/5
- Two electrons are removed from a conductor the charge on it is**
 - 1.6×10^{-19} C
 - 3.2×10^{-19} C
 - 3.2×10^{-19} C
 - neutral

19. When the resistors are connected in series, then the physical quantity which remains constant

- A) Current
- B) Voltage
- C) Capacitance
- D) Inductance

20. When Cu and Ge are cooled to -150°C . Then resistance of Cu _____ and that of Ge _____

- A) Increases, increases
- B) Increases, decreases
- C) Decreases, decreases
- D) Decreases, increases

21. If 2 A current is passed through a wire of 1 ohm resistance for 2.5 s, how much heat will be lost?

- A) 2 J
- B) 4 J
- C) 10 J
- D) 16 J

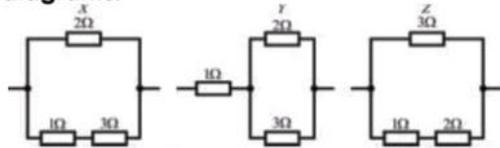
22. If P = power, I = current, V = voltage and R = resistance then conductance G is expressed by

- A) $G = \frac{P^2}{I}$
- B) $G = \frac{I^2}{P}$
- C) $G = \frac{V^2}{I}$
- D) $G = \frac{I^2 P}{R}$

23. We have 3 resistors each of the value 3 Ω . How these are connected to get resultant of 2 Ω ?

- A) All in series
- B) All in parallel
- C) 2 in series and 1 is parallel
- D) 2 in parallel and 1 in series

24. Three resistors of resistance 1 Ω , 2 Ω and 3 Ω respectively are used to make the combinations X, Y and Z shown in the diagrams.



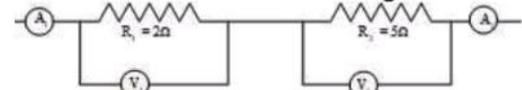
Which of the following gives the combinations in order of increasing resistance?

- A) XYZ
- B) YXZ
- C) XZY
- D) ZXY

25. In combination of resistors the equivalent resistance is higher than any of the resistance used in circuit then it consist of

- A) Parallel combination
- B) Series combination
- C) Both parallel and series combination
- D) Information is not complete

26. A current flows in two resistors connected in series which of the following describes ammeter and voltmeter readings

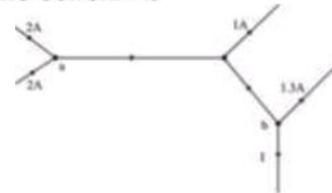


- A) $A_1 = A_2, V_1 > V_2$
- B) $A_1 > A_2, V_1 = V_2$
- C) $A_1 = A_2, V_2 > V_1$
- D) $A_1 < A_2, V_1 = V_2$

27. Slope of the graph between "V" On X-axis and "I" on the Y-axis is

- A) Resistance
- B) emf
- C) Conductance
- D) Capacitance

28. Fig. shows current in a part of electric circuit. The current I is

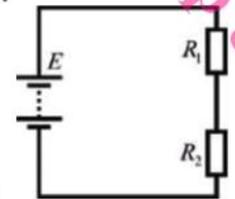


- A) 1 A
- B) 1.7 A
- C) 1.3 A
- D) 3.7 A

29. A wire of resistance R is cut into two equal parts, its resistance becomes R/2, what happens to resistivity:

- A) Double
- B) Half
- C) Same
- D) One fourth

30. A battery of e.m.f E and negligible internal resistance is connected to two resistors of resistance R_1 and R_2 as shown in the circuit diagram? What is the potential difference across the resistors of resistance R_2 ?



- A) $\frac{E(R_1 + R_2)}{R_1}$
- B) $\frac{ER_1}{(R_1 + R_2)}$
- C) $\frac{E(R_1 + R_2)}{R_2}$
- D) $\frac{ER_2}{(R_1 + R_2)}$

WORKSHEET 9

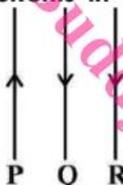
UHS UNIT 11, 12 | ELECTROMAGNETISM, ELECTROMAGNETIC INDUCTION

1. A uniform electric field and a uniform magnetic field exist in a region in the same direction. An electron is projected with velocity pointed in the same direction. The electron will

A) turn to its right
B) turn to its left
C) keep moving in the same direction but its speed will increase
D) keep moving in the same direction but its speed will decrease

2. Three parallel wires carrying equal currents as shown the net force experienced by Q due to currents in P and R is

A) Into the plane of paper
B) Out of plane of paper
C) Towards left
D) Towards right



3. If the number of turns of a current carrying solenoid is doubled and its length is made one-fourth keeping the current same would

A) Increase its magnetic field by two times
B) Increase its magnetic field by four times
C) Decrease its magnetic field by two times
D) Increase its magnetic field by eight times

4. A magnetic needle is kept in a non-uniform magnetic field. It experiences

A) A force only
B) A torque only
C) Both force and torque
D) Neither force nor torque

5. An electron is injected into a uniform magnetic field with components of velocity parallel to and normal to the field direction. The path of the electron is a

A) helix
B) parabola
C) circle
D) straight line

6. To induce an emf in a coil the linking magnetic flux

A) must decrease
B) must remain constant
C) must increase
D) can either increase or decrease

7. A current of 10 A is flowing in a wire of length 1.5m. A force of 15N acts on it when it is placed in a uniform magnetic field of 2T. The angle between the magnetic field and the direction of the current is

A) 30°
B) 60°
C) 45°
D) 90°

8. Current I is flowing in a long conducting wire, the magnetic induction at a distance r from it is 0.4 tesla, then its value at double the distance will be

A) 1.6 T
B) 0.2 T
C) 0.8 T
D) 0.1 T

9. Lenz's law is a consequence of the law of conservation of

A) charge
B) momentum
C) mass
D) energy

10. The value of μ_0 is

A) $4\pi \times 10^{-6} \text{ wbA}^{-1}\text{m}^{-1}$
B) $4\pi \times 10^{-8} \text{ wbA}^{-1}\text{m}^{-1}$
C) $4\pi \times 10^{-7} \text{ wbA}^{-1}\text{m}^{-1}$
D) $4\pi \times 10^{-9} \text{ wbA}^{-1}\text{m}^{-1}$

11. An induced emf is produced when a magnet is plugged into a coil. The magnitude of the induced emf is independent of

A) The strength of the magnet
B) the resistivity of the wire of the coil
C) the speed with which the magnet is moved
D) The number of turns in the coil

12. Which of the following force does no work on moving charge particle

A) electric
B) gravitational
C) friction
D) magnetic

13. When a current carrying conductor is placed in a magnetic field. It moves from a region of

A) stronger to weak field
B) weak to strong field
C) strong to weak if current is large
D) weak to strong if current is large

14. The magnetic lines of force due to straight current carrying conductors are

A) Circular lines
B) Straight lines
C) Concentric lines
D) Elliptical lines

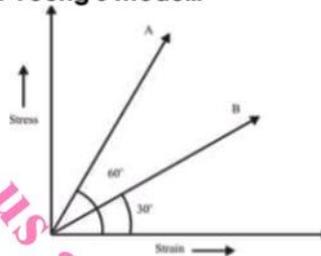
15. If the magnetic flux linked with a coil varies at the rate of 1 wb/min, the induced emf is
 A) 1V
 B) 60 V
 C) 1/60 V
 D) 0.5 V
16. If turns in primary = 50, secondary = 200, primary voltage = 120V, primary current 3A, then output power will be about
 A) 360 W
 B) 300 W
 C) 460 W
 D) Zero
17. In two loops of wire if current is flowing in the same direction, then they will
 A) Attract each other
 B) Repel each other
 C) Neither attract nor repel
 D) Sometimes attract sometimes repel
18. A copper ring having a cut such as not to form a complete loop is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet is
 A) g
 B) more than g
 C) less than g
 D) depends on the relative size of the cut
19. The loss of power in transformer is due to
 A) eddy current
 B) magnetic hysteresis
 C) resistance of coils
 D) all
20. The motional emf depend upon
 A) strength of magnet
 B) length of conductor
 C) speed of the conductor
 D) all of these
21. A step-up transformer is used on a 120 V line to provide a potential difference of 2400 V. If the primary coil has 75 turns, the number of turns in the secondary coil is
 A) 1500
 B) 150
 C) 1200
 D) 1575
22. The emf is induced in a coil of an A.C generator under the phenomenon of
 A) Electrostatic induction
 B) Mutual induction
 C) Self induction
 D) Electromagnetic induction
23. When a charge particle moves in magnetic field at angle 45° the trajectory of charged particle is
 A) Circle
 B) Straight line
 C) Helix
 D) Parabola
24. When north pole of a magnet is moved towards the face of a coil then the face of coil act as
 A) north pole
 B) south pole
 C) neutral
 D) we cannot predict about it
25. If 2 A current is passing through a straight conductor of length "L" and value of B at point P which is 2 cm away from conductor is 10.5 Tesla, If the length of the conductor is reduced to half, then value of B at point p will be
 A) Half
 B) Remain same
 C) Double
 D) Four times
26. A solenoid is a cylindrical, long and tightly wound coil of wire. When a current pass through it behaves like a:
 A) Source of emf
 B) U-shaped magnet
 C) Bar magnet
 D) Transformer
27. When current flows through a conductor in a direction out of the plane of paper the magnetic field has direction
 A) from left to right
 B) from right to left
 C) clock wise
 D) anti clockwise
28. A conductor of length 100 cm is dragged at right angle into a uniform $B = 0.5 \text{ T}$ with a speed of 500 cms^{-1} , the motional emf induced is
 A) 5V
 B) 2.5 V
 C) 5.2 V
 D) 7 V
29. Which of the following have smallest e/m ratio
 A) electron
 B) proton
 C) deuteron
 D) α -particle
30. Primary secondary coils of a transformer have 50 and 200 turns respectively. When primary is connected to 9 volt battery secondary voltage is
 A) 90
 B) 18
 C) 36
 D) Zero

WORKSHEET 10

UHS UNIT 13, 14 | DEFORMATION OF SOLIDS, ELECTRONICS

- Two wires of the same material have length in the ratio $1:\sqrt{2}$ if they are stretched by applying equal forces, the ratio in their Young's moduli will be
 - $2:\sqrt{2}$
 - $1:1$
 - $\sqrt{2}:2$
 - $1:\sqrt{2}$
- Three wires P, Q and R of the same material and length have radii 0.1 cm, 0.2cm and 0.3 cm respectively. Which wire has the highest value of young's modulus of elasticity
 - P
 - Q
 - R
 - All have same
- The permanent deformation is called
 - Elastic deformation
 - Plastic deformation
 - Tensile deformation
 - Compressive deformation
- The energy stored per unit volume of a strained wire is, where Y is the Young's modulus
 - $\frac{1}{2}$ x load x extension
 - $\frac{1}{2} \frac{Y}{(\text{Strain})^2}$
 - $\frac{1}{2} (Y) (\text{Strain})^2$
 - $(\text{Stress})(\text{Strain})$
- Any alternation produced in shapes, length or volume when a body is subjected to some external force is called
 - Stiffness
 - Toughness
 - ve energy state
 - Deformation
- A 1.0m long Cu wire is subjected to stretching force and its length increases by 10cm, percent elongation which the wire undergoes
 - 1%
 - 20%
 - 0.10%
 - 10%
- The hardest material out of the following is
 - Diamond
 - Steel
 - Aluminium
 - Glass
- A wire of length 50 cm and cross-sectional area 1 mm^2 is made of a material of Young's modulus $2 \times 10^{10} \text{ N/m}^2$. How much work is done in stretching the wire through 1mm?
 - $2 \times 10^{-2} \text{ J}$
 - $2 \times 10^{-4} \text{ J}$
 - $4 \times 10^{-2} \text{ J}$
 - $8 \times 10^{-1} \text{ J}$

- The fractional (or relative) change in shape or size is called
 - Strain
 - Stress
 - Elasticity
 - All of these
- Wires of same material have same length but different diameter. If they are stretched by same force then extension in wires is expressed by
 - $\Delta L \propto D^2$
 - $\Delta L \propto \frac{1}{D}$
 - $\Delta L \propto \frac{1}{D^2}$
 - $\Delta L \propto D$
- The stress strain curve of the two materials A and B are shown in the figure, then which of the following relation is correct for their Young's moduli
 - $Y_B = 2Y_A$
 - $Y_A = 2Y_B$
 - $Y_A = 3Y_B$
 - $Y_B = 3Y_A$



- Energy stored per unit volume can also be written as where 'S' the stress and 'Y' is the Young's modulus
 - $\frac{1}{2} \frac{S^2}{Y}$
 - $\frac{2S}{Y^2}$
 - $\frac{1}{2} \frac{Y}{S^2}$
 - $\frac{2S^2}{Y}$
- The strain of magnitude 4.4×10^{-4} has been noted when certain stress is applied on a wire of 11 meter. The wire is then stretched by an amount of
 - 4.84m
 - 4.84cm
 - 4.84mm
 - 4.84 μm

14. A mass m is hung to a string. After some time, it was observed that mass m moves up from its initial position. This is due to
- Decrease in temperature
 - Increase in pressure
 - Increase in temperature
 - Change in humidity
15. Which one has only bulk modulus?
- Diamond
 - Glass
 - Tungsten
 - Water
16. The maximum stress which a body can bear is called its
- Ultimate tensile strength
 - Permanent stress
 - Elastic stress
 - All type of stress
17. If the force is applied tangentially to one face of a rectangular body, keeping the other face fixed, the stress is called
- Longitudinal stress
 - Tensile stress
 - Shearing stress
 - Tangential strain
18. A wire can support a load 'W' without breaking. It is cut into two equal parts. The maximum load that each part can support is
- $W/2$
 - W
 - $W/4$
 - $2W$
19. Slope of force-extension graph has same dimensions as that of
- Spring constant
 - Pressure
 - Stress
 - Strain
20. Solid possess
- bulk modulus
 - shear modulus
 - Young's modulus
 - All of these
21. If stress is increased beyond the elastic limit of material it becomes permanently changed this behavior is called
- Elasticity
 - Elastic deformation
 - Plasticity
 - Yield point
22. The modulus of rigidity of a liquid is
- zero
 - 1
 - infinite
 - none of these

23. If fracture stress is represented by ' σ_f ' and an ultimate tensile strength by ' σ_m ' then
- $\sigma_m > \sigma_f$
 - $\sigma_m = \sigma_f$
 - $\sigma_m < \sigma_f$
 - None of these
24. A pn junction is said to be reverse biased
- no potential difference is applied across it
 - a potential difference is applied across it making p – region positive and N – region negative
 - a potential difference is applied across it making p – region negative and N – region positive
 - a magnetic field is applied in the region of the junction
25. When two semiconductors of p and n type are brought in contact, they form a pn junction which acts like a/an
- oscillator
 - amplifier
 - rectifier
 - conductor
26. A diode can convert
- ac into dc but not dc into ac
 - ac into dc and dc into ac
 - dc into ac but not ac into dc
 - neither ac into dc nor dc into ac
27. The energy of photon is given by
- m_0c^2
 - $\frac{1}{2}mv^2$
 - mgh
 - hf
28. The gain of non-inverting amplifier is
- R_1/R_2
 - $1 + R_1/R_2$
 - $1 + R_2/R_1$
 - $1 - R_1/R_2$
29. For an operational amplifier the output resistance is the resistance between
- inverting input and ground terminal
 - non inverting input and ground
 - output terminal and ground
 - input and output terminal
30. Operational amplifier can be used as
- inverting amplifier
 - non-inverting amplifier
 - comparator
 - All of these

WORKSHEET 11

UHS UNIT 15 | MODERN PHYSICS

1. In the X-rays production, let λ_c be the cut off wavelength, λ_A be the wavelength of K-alpha line and λ_B be wavelength of K-beta line, then

A) $\lambda_B > \lambda_A > \lambda_c$ C) $\lambda_A > \lambda_c > \lambda_B$
 B) $\lambda_A > \lambda_B > \lambda_c$ D) $\lambda_B > \lambda_c > \lambda_A$

2. If the electron may suffer number of collision before coming to rest they will give rise to photon of

A) Greater energy
 B) Short wavelength
 C) Smaller energy
 D) Both "A" and "C"

3. X-rays penetrates

A) Few meters
 B) Few centimeters
 C) Several meters
 D) Several centimeters

4. X-rays are produced by applying potential difference of 40 kV. Find minimum wavelength produced

A) 3.3×10^{-10} m C) 0.3×10^{-10} m
 B) 3.3×10^{-12} m D) 3.3×10^{-6} m

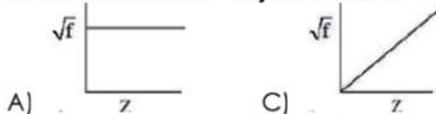
5. X-rays region lies between

A) Short radio waves and visible region
 B) Visible and ultraviolet region
 C) Gamma rays and ultraviolet region
 D) Short radio waves and long radio waves

6. X-rays are not used in RADAR, because

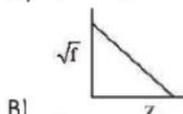
A) X-rays are not reflected by target
 B) X-rays are completely absorbed by air
 C) X-rays damage the target.
 D) All of these

7. Which of the following graph about characteristics X-rays is correct?



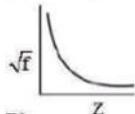
A)

C)



B)

D)



8. Intensity of X-rays depends upon

A) Current through filament
 B) Potential of cathode
 C) No. of electrons incident per sec
 D) Both "A" and "C"

9. Photon of X-rays are of

A) High-energy
 B) Very low
 C) Low energy
 D) No energy

10. X-rays consist of series of specific wavelengths and hence is called

A) Special X-rays
 B) Normal X-rays
 C) Characteristics X-rays
 D) None of these

11. The wavelength λ of the K_α line of characteristic X-ray spectra varies with atomic number Z approximately as

A) $\lambda \propto Z$
 B) $\lambda \propto \sqrt{Z}$
 C) $\lambda \propto \frac{1}{Z^2}$
 D) $\lambda \propto \frac{1}{\sqrt{Z}}$

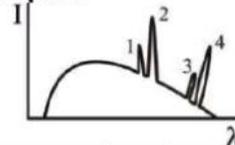
12. Which of the following is the correct sequence of EMW with respect of increasing frequency.

A) Visible, IR, UV, X-rays
 B) IR, X-rays, γ -rays
 C) Visible, UV, X-rays, γ -rays
 D) γ -rays, X-rays, UV, IR

13. Kinetic energy of electrons by applying potential difference V_1 across the X-ray tube is KE_1 while V_2 potential difference produces kinetic energy equal to KE_2 . What will be the value of $KE_1 : KE_2$ if ratio of potential difference $V_1 : V_2 = 2 : 3$?

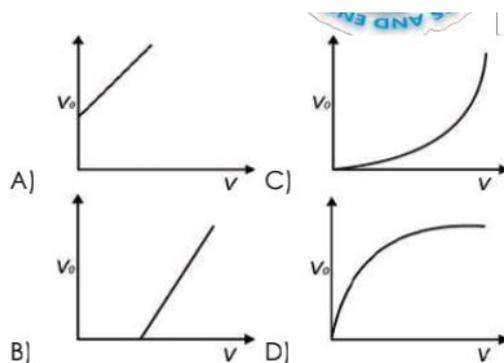
A) 3:2
 B) 4:9
 C) 9:4
 D) 2:3

14. According to the following graph identify the correct option



Peak	1	2	3	4
A) X-ray photon	K_α	K_β	L_α	L_β
B) X-ray photon	L_α	L_β	K_α	K_β
C) X-ray photon	L_β	L_α	K_β	K_α
D) X-ray photon	K_β	K_α	L_β	L_α

15. The shortest wavelength of X-rays emitted from an X-ray tube, operate at 2×10^6 V is of the order of
 A) 1 Angstrom C) 0.5 Angstrom
 B) 10^{-2} Angstrom D) 10^{-5} Angstrom
16. The ratio of speed of γ -rays and X-rays is
 A) 1 C) <1
 B) >1 D) None of these
17. The photoelectric effect is the ejection of electrons from the surface of a metal when
 A) it is heated to a high temperature
 B) electrons of suitable velocity strike it
 C) radiation of suitable wavelength falls on it
 D) it is placed in a strong electric field
18. Photoelectric effect can be explained only by assuming that electromagnetic radiation
 A) is a transverse wave
 B) can be polarized
 C) is a longitudinal
 D) consists of quanta
19. Einstein's photoelectric equation is $E_k = hf - \Phi$ in this equation E_k refers to
 A) kinetic energy of all the emitted electrons
 B) mean kinetic energy of emitted electrons
 C) maximum kinetic energy of emitted electrons
 D) minimum kinetic energy of emitted electrons
20. The maximum energy of the electrons released in a photo cell is independent of
 A) frequency of incident light
 B) nature of cathode rays
 C) intensity of incident light
 D) none of these
21. Light of frequency 1.5 times the threshold frequency is incident on a photo sensitive material. If the frequency is halved and intensity is doubled the photo electric current becomes
 A) four times C) half
 B) double D) zero
22. Momentum of a photon of frequency f is
 A) hf/c^2 C) hf/c
 B) hfc D) hfc^2
23. In photoelectric effect, the graph showing the variation of cut - off voltage (V_0) with the frequency of incident radiation (f) is



24. When ultraviolet radiation is incident on a surface, no photoelectrons are emitted from the surface. If another beam causes photoelectrons to be emitted, it may consist of
 A) radio waves C) infrared rays
 B) X - rays D) visible
25. Which theory explain the electrical properties of material
 A) Rutherford atomic model theory
 B) Energy band theory
 C) Bohr atomic model theory
 D) de-Broglie theory
26. The number of bands necessary for electrical conduction
 A) 2 C) 5
 B) 4 D) 3
27. There is large number of energy states between valance and conduction bands
 A) which can occupied by electrons
 B) which cannot be occupied by electrons
 C) which can occupied by neutrons
 D) which occupied by protons
28. Pfund series contains the wavelength given by the formula
 A) $\frac{1}{\lambda} = R_H \left[\frac{1}{1^2} - \frac{1}{n^2} \right]$ C) $\frac{1}{\lambda} = R_H \left[\frac{1}{3^2} - \frac{1}{n^2} \right]$
 B) $\frac{1}{\lambda} = R_H \left[\frac{1}{5^2} - \frac{1}{n^2} \right]$ D) $\frac{1}{\lambda} = R_H \left[\frac{1}{4^2} - \frac{1}{n^2} \right]$
29. The Balmer series contain wavelengths in the _____ of the hydrogen spectrum.
 A) visible portion C) UV portion
 B) infrared portion D) all of these
30. Lyman series contains the wavelength given by the formula
 A) $\frac{1}{\lambda} = R_H \left[\frac{1}{1^2} - \frac{1}{n^2} \right]$ C) $\frac{1}{\lambda} = R_H \left[\frac{1}{3^2} - \frac{1}{n^2} \right]$
 B) $\frac{1}{\lambda} = R_H \left[\frac{1}{5^2} - \frac{1}{n^2} \right]$ D) $\frac{1}{\lambda} = R_H \left[\frac{1}{4^2} - \frac{1}{n^2} \right]$

WORKSHEET 12

UHS UNIT 16 | NUCLEAR PHYSICS

- ${}_{86}^{222}\text{A} \rightarrow {}_{84}^{210}\text{B}$ in this reaction, how many α and β emission have occurred
A) $6\alpha, 3\beta$ C) $3\alpha, 6\beta$
B) $4\alpha, 3\beta$ D) $3\alpha, 4\beta$
- In a β -decay**
A) The parent and the daughter nuclei have the same number of protons
B) The daughter nucleus has one proton less than the parent nucleus
C) The daughter nucleus has one proton more than the parent nucleus
D) The daughter nucleus has one neutron more than the parent nucleus
- In radioactivity, the rate of decay**
A) Can be increased by magnetic field
B) Can be kept constant by the electric field
C) Can be decreased by the magnetic fields
D) In not effected by electric and magnetic field
- Nuclear force between nucleons is independent of their**
A) Separation
B) Charge
C) Spin
D) All of these
- If 15/16 of radioactive atoms decays in 16 hours, the half life of element is**
A) 16 hours
B) 8 hours
C) 4 hours
D) 2 hours
- If a nucleus ${}^A_Z\text{X}$ emits an α -particle and resultant nucleus emits a β particle, then atomic charge and mass number of final nucleus will be**
A) $Z-2, A-4$
B) $Z-1, A-4$
C) $Z-32, A-4$
D) $Z, A-Z$
- Nucleons present in nucleus are also spinning. Due to their spin, nucleons**
A) Attracts each other
B) Repel each other
C) May attract or repel
D) Neither attract nor repel
- As mass number A varies which of quantity related to nucleus does not change**
A) Mass
B) Volume
C) Binding energy
D) Density
- Particle not emitted by a radioactive substance are.**
A) γ -rays
B) Electrons
C) Protons
D) ${}^4_2\text{He}$
- Two nucleons are at a separation of 1×10^{-15} m. The net nuclear force between them is F_1 if both are neutrons, F_2 if both are protons, and F_3 if one is a proton and the other is neutrons then which of the following is correct**
A) $F_1=F_3>F_2$
B) $F_1=F_2>F_3$
C) $F_1=F_2=F_3$
D) $F_2>F_1>F_3$
- A radioactive nucleus X undergoes a series of decay according to the scheme**
$$\text{X} \xrightarrow{\alpha} \text{X}_1 \xrightarrow{\beta^-} \text{X}_2 \xrightarrow{\alpha} \text{X}_3 \xrightarrow{\gamma} \text{X}_4$$
If the mass number and atomic number of X are 180 and 72 respectively, the corresponding number for X_4 are
A) 176, 69
B) 172, 69
C) 176, 71
D) 172, 71
- A radioactive material has a half life of 100s. If initial amount of the material is 400 mg, then amount left after 300s in mg is**
A) 100
B) 133
C) 200
D) 50
- The half life of a radio isotope is 2400 years. The activity of a sample is 720 counts/s. How long will it take for the activity to fall to 90 counts/s?**
A) 3000 years
B) 7200 years
C) 4800 years
D) 19200 years

14. A radioactive nucleus ${}_{92}^{235}\text{X}$ decays to ${}_{91}^{231}\text{Y}$. Which of the following particles are emitted?

- A) One α -particle and one electron
- B) Two deuterons and one positron
- C) One α -particle and one proton
- D) One proton and four neutrons

15. One reaction which might be used for controlled nuclear fusion is shown.



What is particle X?

- A) An α -particle
- B) A neutron
- C) An electron
- D) A proton

16. The nucleus of one of the isotopes of nickel is represented by ${}_{28}^{60}\text{Ni}$. Which line in the table correctly describes a neutral atom of this isotope?

	No. of protons	No. of neutrons	No. of electrons
A)	28	32	28
B)	28	60	28
C)	0	28	28
D)	60	32	32

17. The half-life of a certain radioactive isotope is 32 hours. What fraction of a sample would remain after 16 hours?

- A) 0.25
- B) 0.50
- C) 0.29
- D) 0.71

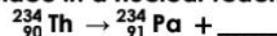
18. In order to trace the line of a water-pipe buried 0.4m below the surface of a field, an engineer wishes to add a radioactive isotope to the water. Which sort of isotope should be chosen?

	Emitted	Half-life
A)	β	A few hours
B)	β	Several years
C)	γ	A few hours
D)	γ	Several years

19. The uranium Nucleus ${}_{92}^{238}\text{U}$ undergoes successive decays, emitting respectively α -rays, β -rays and γ -rays. What is the atomic number and atomic mass of the resulting Nucleus

- A) 90, 238
- B) 91, 234
- C) 92, 236
- D) 92, 238

20. Which one of the following emissions takes place in a nuclear reaction?



- A) Alpha
- B) Gamma
- C) Beta
- D) Photons

21. Radioactive radiations are known to cause ionization. To produce excess ionization in air at S.T.P, use has to be made of

- A) α -rays
- B) γ -rays
- C) β -rays
- D) X-rays

22. The mass defect is defined as

- A) $\Delta m = Zm_p + (A-Z)m_n - m_{\text{nucleus}}$
- B) $\Delta m = Zm_p + (A-Z)m_n - m_{\text{nucleus}}$
- C) $\Delta m = Zm_p + (A-Z)m_n + m_{\text{nucleus}}$
- D) $\Delta m = Zm_p + (A+Z)m_n + m_{\text{nucleus}}$

23. The binding energy is defined as

- A) B.E. = $Zm_p c^2 + (A-Z)m_n c^2 - m_{\text{nucleus}} c^2$
- B) B.E. = $Zm_p c^2 + (A-Z)m_n c^2 + m_{\text{nucleus}} c^2$
- C) B.E. = $Zm_p c^2 + (A+Z)m_n c^2 + m_{\text{nucleus}} c^2$
- D) B.E. = $Zm_p c^2 + (A+Z)m_n c^2 - m_{\text{nucleus}} c^2$

24. The most stable element is

- A) copper
- B) uranium
- C) iron
- D) cobalt

25. The amount of energy required to break the helium nucleus into two protons and two neutrons is

- A) 931 MeV
- B) 9.31 MeV
- C) 82.1 MeV
- D) 28.2 MeV

26. To start a fusion reaction the temperature at which the required speed of the light nuclei can be obtained is

- A) 10 billion degree Celsius
- B) 10 million degree Celsius
- C) 30 million degree Celsius
- D) 10 mega billion degree Celsius

27. During the fission reaction the amount of energy released per nucleon is about

- A) 0.9 MeV
- B) 7.7 MeV
- C) 28 MeV
- D) 200 MeV

28. In p-p chain reaction the amount of energy obtained per nucleon is

- A) 200 MeV
- B) 25.7 MeV
- C) 1 MeV
- D) 6.4 MeV

29. The temperature at surface of the sun is

- A) 7000 °C
- B) 5×10^6 °C
- C) 3400 °C
- D) 6000 °C

30. In sun the energy is released due to fusion reaction called

- A) p-reaction
- B) n-reaction
- C) p-p reaction
- D) p-n reaction

ANSWER KEY PHYSICS WORKSHEETS

Worksheet No. → Q. No. ↓	1	2	3	4	5	6	7	8	9	10	11	12
1	B	C	A	D	A	A	A	A	D	B	B	D
2	D	B	B	C	A	B	B	B	D	D	C	C
3	A	B	D	B	A	D	B	A	D	B	C	D
4	A	C	D	C	C	A	B	B	C	C	C	B
5	D	D	A	C	C	A	A	B	A	D	C	C
6	D	C	C	C	B	C	B	D	D	D	A	B
7	C	A	D	C	A	B	A	D	A	A	C	C
8	C	A	C	B	B	B	D	C	B	A	D	D
9	A	C	C	B	A	A	C	B	D	A	A	C
10	B	B	A	A	C	D	A	C	C	C	C	C
11	C	B	A	A	D	D	B	B	B	C	C	B
12	C	D	B	C	A	B	A	D	D	A	C	D
13	C	B	D	D	A	C	C	C	A	C	D	B
14	D	B	B	B	B	A	D	D	A	A	D	A
15	A	A	A	D	B	A	C	D	C	D	B	C
16	A	C	C	C	B	B	D	B	A	A	A	A
17	A	B	A	B	B	D	A	C	A	C	C	D
18	B	B	D	B	D	D	C	B	A	B	D	C
19	A	D	A	D	C	D	C	A	D	A	C	B
20	C	A	A	A	C	B	B	D	D	D	C	C
21	C	A	A	B	C	A	A	C	A	C	D	A
22	B	C	D	A	D	D	A	B	D	A	C	B
23	A	B	A	D	C	B	D	C	C	A	B	A
24	A	C	D	A	C	A	C	C	A	C	B	C
25	D	B	C	B	D	D	B	B	B	C	B	D
26	D	C	D	D	C	B	D	C	C	A	A	B
27	C	C	C	B	C	C	C	C	D	D	B	A
28	D	A	A	A	C	C	C	A	B	C	B	D
29	C	B	C	A	A	C	D	C	D	C	A	D
30	C	A	D	-	C	B	A	D	D	D	A	C